Kitchen chemistry: A scoping review of the diversionary use of pharmaceuticals for non-medicinal use and home production of drug solutions

Marie Claire Van Hout*

Misuse of pharmaceuticals is of increasing drug policy and public health concern. A scoping review was conducted on the diversionary use of pharmaceuticals for non-medicinal use and home production of drug solutions. The research question was broad: What is known from the existing literature about the diversion of pharmaceuticals for non-medicinal use and for home production of drug solutions? The scoping process centred on the systematic selection, collection, and summarization of existing knowledge within this broad thematic remit. One hundred and thirty-four records were grouped into discrete thematic categories namely: non medicinal use and tampering with pharmaceuticals, oral misuse of codeine cough syrups, homemade drug solutions, and home-produced drug-related harms in the narrative review design. Forms of abuse of codeine cough syrup include mixtures with alcohol or soft drinks (‘Purple Drank’), with kratom leaves (‘Kratom cocktails’), or chemically altered to extract dextromorphan (‘Lemon Drop’). Production of homemade opiates (‘Cheornaya’, ‘Kolyosa’, ‘Himija’, ‘Braun’, ‘Krokodil’), methamphetamine (‘Vint’, ‘Pervitin’), methcathinone (‘Jeff’), and cathinone (‘Boltushka’) are described. Displacement patterns between the non-medical use of pharmaceuticals, commercial, and homemade drugs appear dependent on availability of opiates, prescribing practices, supervision of substitution drug dosing, availability of cheap ingredients, policing, and awareness of harms. Adverse health and social consequences relate to the use of unknown and contaminated (end) substances, injecting practices, redosing, medical complications, and death. The review highlights a public health imperative requiring a multidisciplinary approach to quantify potential impact and required integrated policy responses incorporating international regulation, enforcement, health surveillance and service delivery. Copyright © 2014 John Wiley & Sons, Ltd.

Keywords: pharmaceuticals; diversion; tampering; non-medicinal; drug solution

Introduction

The emergence and diffusion of novel psychoactive substances, including synthetic cathinones or cannabinoids, remain of interest to researchers, drug policymakers, and harm reduction and clinical practice[1–7] given their (often) untested status, potential for harm, misrepresentation of contents, and availability in a variety of forms on the Internet.[8–12] However, the misuse, diversion, tampering, home manufacture, and injecting use of over-the-counter and prescribed pharmaceuticals are an emerging global issue.[13,14] In the 2013 UNODC World Drug Report,[15] countries such as Australia, Bangladesh, Canada, Germany, Indonesia, Nigeria, Pakistan, Republic of Korea, United States, Sweden, Hong Kong, and China have indicated rising non-medical use and diversion of pharmaceuticals. Efforts to quantify this form of drug use are confounded by legal status and availability of pharmaceuticals. Non-medical use of pharmaceutical drugs is characterized by tampering with formulations, extraction active ingredients, consumption exceeding the recommended dosage, and alterations in route of administration, in order to enhance the desired psychoactive effect.[16–24] Sourcing occurs via prescribers, friends, and relatives,[13,25] on the street, and through unregulated web retailers.[26] Patterns of pharmaceutical misuse are evident in the poly prescribing of pharmaceuticals (i.e. benzodiazepines), poly substance use with methadone, street drugs and alcohol, and when pharmaceutical medications are used as part of an ingredient list for home manufacture of psychoactive drugs.[27–35] In 2011, the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) report[2] reported on trend increases in the misuse of opioids other than heroin. These include pain relievers (morphine, fentanyl, codeine, oxycodone, hydrocodone) and substitution drugs used in the treatment of heroin dependence (methadone, buprenorphine). Inappropriate and excessive prescribing of opioids, increased coverage of substitution treatment, low levels of supervised consumption of substitution drugs, reduced local availability of heroin and user self-medication for psychoactive effects and in avoidance of withdrawals fuel the rise in diversion of opioid pharmaceuticals.[2,36] Home manufacture of opiate and stimulant drugs using over-the-counter and illicitly sourced pharmaceuticals has become increasingly popular among injecting and recreational drug users.[37,38] Common pharmaceuticals sourced for home manufacture are codeine, pseudoephedrine, pentazocine, promethazine hydrochloride, and dextromethorphan. Market factors driving rates of use of these home-manufactured drugs...
include the relative ease of sourcing via pharmacies or on the street, the ease of conversion of chemicals, the market status relative to other available substances, and the relative cost-benefit ratio of use.  

The aim of the review was to scope the available literature to date on the diversionary use of pharmaceuticals for non-medicinal use and for the production of homemade drug solutions.

The scoping review

Scoping study methods are increasingly advocated for the broad searching of literature on a specific topic and are used to highlight the key issues, gaps in the evidence base, and avenues for further research, policy, and practice intervention.  

Scoping reviews do not synthesize evidence, assess the quality of evidence, or aggregate findings from different studies.  

With this in mind, a broad search was conducted and guided by the following research question: What is known from the existing literature about the diversion of pharmaceuticals for non-medicinal use and for home production of drug solutions? The process centred on the systematic selection, collection, and summarization of extant knowledge within the broad thematic remit of diversion of pharmaceuticals, non-medicinal forms of use, and use in homemade drug solutions.

Published studies were identified through computerised searches of electronic databases EBSCO Host, Science Direct, Pub Med, EMBASE, and PsycINFO using a variety of search terms to identify academic research, reports, reviews, and clinical case studies. Follow-up search strategies included hand searching of records and searching of pharmaceutical, health, medical, and drug-related websites. In order to eliminate studies which did not address the central research question, inclusion and exclusion criteria and the screening of titles, abstracts, and keywords for duplication and lack of specificity were utilized.

No restrictions were placed on language, although all search terms were English. Animal studies were excluded. The search generated 194 records, with 24 duplicates and 36 excluded for lack of specificity. Additional references were located in reference lists found in published peer reviewed studies (n = 6).

Crosschecking of the final eligible selection of 134 data records for inclusion was undertaken by an independent researcher.  

The process of navigating and redefining the findings was iterative, and with each stage reflexive, by fine tuning and repeating steps so as to ensure comprehensive coverage of available literature. The data was grouped into discrete thematic categories which framed the original research question and is hereafter presented as a broad based ‘narrative review’ design.

Non-medicinal use and tampering with pharmaceuticals

Non-medicinal use of pharmaceuticals is characterized by the consumption of pharmaceutical medications, both prescribed and over the counter other than as medically advised or by an individual for whom the drug is not prescribed. The extent of this ‘hidden’ form of drug misuse and dependence is largely unrecorded, and relies on individuals presenting for treatment.  

Tampering with formulations results in higher dose consumption and alternative routes. Physical or chemical alteration of pharmaceuticals is conducted to heighten the intended psychoactive onset and duration of effect, to eliminate any undesirable active ingredients and excipients, and to chemically modify certain actives. Narcotic analgesics, stimulants, and depressants are most commonly misused and tampered with. For an extensive review of the tampering of all pharmaceutical formulations (alprazolam, dronabinol, fentanyl, amphetamine preparations, methylenidate, modafinil, morphine, buprenorphine, oxycodone, and phentermine preparations), it is recommended to consult Cone.  

Tampering in the form of crushing, separation from undesirable actives, overcoming time-release formulations, purification and chemical alteration of formulations, along with advice around optimal use (dosage, route) are readily available on the Internet.  

Pharmaceutical manufacturers continue to develop intended and unintended barriers to tampering and dis-incentivization of misuse by using flavours, dyes, fillers, binders in oral formulations, coating, bead- or crush-resistant compounds, time-release matrices, gel capsules, and producing combination products with undesirable actives such as aminophen, aspirin, ibuprofen, and caffeine.  

Although efforts to minimize abuse potential and harm, drug users favour simplistic procedures to alter formulations and are generally deterred by homemade drug solutions which are difficult to produce or inject. Displacement patterns between pharmaceutical drugs of abuse have been observed particularly in the case of long acting oxymorphone, which replaced the long-acting formulation of oxycodone, when oxycontin was reformulated.  

According to Romach et al. in 2013, pharmaceutical attempts to deter tampering and misuse are somewhat compromised by relative impact on those who misuse, and those compliant with prescribing guidelines, and require broad public health and regulatory support.

Oral misuse of codeine cough syrups (CCS)

The harmful effects of codeine misuse and dependence are recognized by the medical community. Misuse of codeine can occur in pill or syrup form, with the misuse and tampering with codeine cough syrup well documented in the USA, India, Hong Kong, and Japan.  

Over-the-counter and prescribed forms exist and contain various levels of codeine, dextromethorphan, and promethazine hydrochloride. In the USA, and particularly in southern states, codeine cough syrup is mixed with alcohol or soft drinks (i.e. Sprite) and called ‘Purple Drank’, ‘Syrup,’ ‘Barre’, ‘Purple Tonic’, ‘Sizzurp’, ‘Texas Tea’, ‘Tsikuni’ and ‘Lean or Southern Lean’ (nicknamed for the slumped posture in intoxicated users). The purple hue of Purple Drank results from the dye in codeine cough syrup. The popularity of this drink is associated with southern rap music inspired by intoxication on codeine and promethazine, and identified by its ‘chopped and screwed’ beats, which are significantly slower, skipped, and relaxed, and likened to the codeine-induced cardiovascular depressant effect.  

When consumed in large quantities, dissociation, sedation, and altered levels of consciousness are described. Popularity among younger users appears grounded in social norms beliefs centring on low perception of risk, low abuse potential, and low incidence of adverse consequences. Use of codeine cough syrups such as Purple Drank are largely confined to males in urban black ethnic groups and homosexuals, and associated with poly substance use, use of novel psychoactives, and high levels of sexual activity. In 2013, commercial trends in the beverage industry reflect...
development of ‘anti energy’ drinks producing the opposite effect of stimulant drinks and advertised as ‘Extreme Relaxation Beverage,’ ‘Sippin Syrup Drank,’ ‘Unwind,’ and ‘Mary Jane’s Relaxation Soda.’ These drinks are labelled to contain melatonin (2 mg), rose hips, and valerian root extract (20 mg), and retailed via convenience stores and online. Brownies called ‘1/2 Baked Brownzz’ containing similar ingredients are also retailed.

Codeine cough syrups are also used for the home production of ‘Kratom Cocktails’ in Thailand, and consist of boiled kratom leaves, a soft drink, the codeine cough syrup, and sometimes the addition of alprazolam. This mixture is popular amongst youth and is also served with ice, yoghurt, or coffee. Kratom leaves contain over 25 alkaloids which include mitragynine, paynantheine, mitraphylline, and 7-hydroxymitragynine, with mitragynine the major psychoactive constituent.79,80 Active ingredients of Kratom Cocktail mixtures are identified as mitragynine, caffeine, codeine, chlorpheniramine, and phenylephrine.79 They are illegal in Thailand but not in Europe or the United States, where kratom leaves mixed with tramadol (a synthetic opioid analgesic) dubbed ‘Krypton’ is popular.80 Kratom leaves retail online and in smart shops (shops specializing in the psychoactive substances and related paraphernalia) as whole or crushed green leaves, as a green powder, or in capsules. Another trend in the non-medical use of codeine cough syrups is the homemade drug solution produced from a mixture of paint solvent (naphtha with ammonia) or lighter fluid with the codeine cough syrup, and produced so as to extract the dextromethorphan. The resultant solution is then mixed with lemon juice or powdered lemonade mix and called ‘Lemon Drop’.

Homemade drug solutions

EMCDDA81 is monitoring increasing diversion and misuse of opioids other than heroin in Europe. Fentanyl, a potent opioid analgesic and marketed as transdermal (Duragesic® patch) and oral transmucosal (Actiq®) preparation is most commonly reported in the EU and countries bordering the EU (Russia and Belarus).15,82–84 Both new and used fentanyl patches are in demand by opioid users, with a powered form made by diluting fentanyl with acetaminophen and caffeine and known as ‘China White’ or ‘White Persian’.2,84 Of note is that in western and central Europe, drugs purchased for injecting are mostly in powder form, whereas in most of the Baltic States, a large proportion of drug users inject homemade opiate solutions in liquid form.1,2,81 The ‘Kompot’ method traditionally involves stewing the opium poppy in boiling water and an acid with subsequent injection of the strained liquid, and more contemporary methods involving the extraction of opiate alkaloids from poppy straw (Papaver somniferum) by ion exchange resin and filtering with recovery of opiates by addition of ammonia water.85

Some data sources report on how the small scale regional production of homemade opiates (called ‘Cheornaya’ in Russia, ‘Himiya’ in Ukraine and ‘Braun’ in the Czech Republic), methamphetamine (‘Vint’), methcathinone (‘Jeff’) and cathinone (‘Boltushka’) has occurred in response to reduced availability of heroin in Russia, the Baltic States, and in all five central Asian countries.85–90 In post-Soviet Europe, a displacement between homemade seasonal drugs (such as ‘Shirka’ made from poppy straw) and diversification towards the use of diverted prescription pharmaceuticals for home-produced drug solutions has been observed (e.g., Kolyosa, made from prescription pills containing codeine, and Vint, made by extracting (pseudo) ephedrine from prescription and over the counter cold medications).37,93 However despite these emerging trends using pharmaceuticals, according to Eritsyan et al.90,94 commercial heroin remains the predominant form of opioid injected in most Russian cities.

The practice of home manufacture of injectable drug solutions has remained common in the Ukraine, and with amphetamine type stimulants particularly popular.87,91–94 Of note is that amphetamine-type stimulant recipes differ geographically and contain varied levels of active ingredients produced from pharmaceutical cold medications containing codeine, (pseudo) ephedrine, phenylpropanolamine as well as common household chemicals.93–95 A popular homemade cathinone called ‘Boltushka’ is made by mixing crushed cold medications containing phenylpropanolamine with warm water, vinegar, and potassium permanganate until it reaches a dark brown colour and ‘smells of cherries’ (a scent associated with ketones).93,95,97 Potassium permanganate or ‘marginzovka’ (маргантюлка) is widely used as disinfectant in Russia. Similarly, in the Czech Republic, the localized cooking of ‘pervitin’ (used as a slang name for street methamphetamine) is made from industrial chemicals and (pseudo) ephedrine extracted from cough medications.85,98,99 Reports indicate that injecting drug users in Russia, Ukraine, and other countries no longer source poppies or raw opium for injectable drug solutions, and have diverted their attention to available medications containing codeine in pharmacies.91 The Soviet tradition of home drug solutions is viewed as contributory to the production of new, accessible, and affordable forms of injecting drug use using available pharmaceuticals.114 A home drug solution associated with the misuse of codeine, is the production of ‘Braun’ made from a mixture of morphine and codeine preparations such as Alnagon®, Korynal®, Kodynal, or Ipecarin®.84 Desomorphine is generated from codeine via two synthetic steps.100,101 Codeine preparations available over the counter in pharmacies (such as Codelac® and Terpinod®) are used for reduction of codeine using iodine, lighter fluid, hydrochloric acid, gasoline, industrial cleaning oil, and red phosphorus (sometimes obtained from striking pads of matchboxes) in a short process similar to that of making methamphetamine from pseudoephedrine.102–107 The process is known as the ‘red, white and blue cook.’102

The home production of desomorphine (originally dubbed ‘Russian Magic’) is better known as ‘Krokodil’ (крокодил or crocodile) and came to light in Russia in 2003.102,105,106 Print screen and online media reporting, whilst sensationalist and for the most part reporting on isolated cases elsewhere, have reported on suspected clinical presentations and fatalities in the UK, Germany, Poland, Czech Republic, France, Belgium, Sweden, Norway, and other European countries with Russian populations.105–107 and in late 2013 in the USA. An extensive review on this injectable drug solution by Grund et al.101 reports on emerging use in Russia, Ukraine, Georgia, and Kazakhstan.108–110 Krokodil appears to be a relatively new phenomenon there, with estimates of between 20 000 and 100 000 injectors of the drug in 2011, and reported as most commonly used opiate amongst substitution therapy patients in Georgia.110 The rise in Russian Krokodil addicts stimulated a regulatory shift towards the upscheduling of codeine preparations in 2011.

According to Gahr et al.,105 no scientific qualitative chemical analysis of the solution known as Krokodil exists. Savchuk
et al.\textsuperscript{[102]} in their work using gas chromatography suggest that simple reduction with iodine and phosphorus does yield desomorphine ranging from trace to 75%. Four synthetic analogues of desomorphine, codeine, and other compounds were identified in desomorphine samples, and authors commented on the range of different procedures and conditions involved in the synthesis of desomorphine in various regions of Russia. Presence of contaminants and residues of iodine, phosphorus, heavy metals and other chemicals such as iodocodine, terpinhydrate, dimedrol, analgin, caffeine, paracetamol, and diphenhydramine were observed to complicate chemical reactions and outcomes.\textsuperscript{[91]} Grund, et al.\textsuperscript{[91]} emphasize the need for field testing of Krokodil samples and continued efforts for empirical research on its synthetic pathways, the effect of the presence of certain medicines, chemicals, and reagents on chemical reactions and manufacturing processes. Of concern is that the analgesic effect of desomorphine is ten times greater than that of morphine, with toxicity exceeding morphine by about three times. Given its shorter half-life, this presents great potential for abuse.\textsuperscript{[91,111]} The co-injecting use of other drugs such as fentanyl,\textsuperscript{[103]} tianeptine, or tropicamide (contained eye drops) has been reported and further compound abuse trajectories and adverse health consequences.\textsuperscript{[109]}

In New Zealand, the production of homemade drug solutions for injecting use is known as ‘Home Bake’, and most commonly made from morphine- and codeine-based pharmaceuticals.\textsuperscript{[112–115]} The pharmaceuticals required are obtained via pharmacy theft, street drug sourcing, and from patients prescribed with pain medication.\textsuperscript{[116]} The conversion process from morphine sulphate tablet to diacetylmorphine or heroin is relatively simple, with few impurities, and requires a spoon, heat source, baking soda, citric acid, water, and acetic anhydride.\textsuperscript{[117]} Acetic anhydride or ‘double’ whilst strictly regulated,\textsuperscript{[29]} is readily available via street sourcing.\textsuperscript{[115]} In contrast, converting prescribed or over-the-counter codeine-based pharmaceuticals to diacetylmorphine is relatively complex, and involves additional reagents.\textsuperscript{[115]} The resultant home-produced opiate is sold as powder for acetylation or in liquid form, and is reportedly relatively pure.\textsuperscript{[112]} Both processes are however, restricted to small-scale production.

### Home-produced drug-related harms

Homemade drug solutions are associated with a myriad of dangers.\textsuperscript{[93,104,105,107,118–121]} Concerns with regard to the regulatory effect on codeine and pseudoephedrine products remain, given the potential risks present in the production process in the form of contamination, sharing of equipment, powders and solutions, and injecting practices.\textsuperscript{[91,96,115]} Of interest is the reported small-scale nature of the cook-up, with little reported communication relating to use or distribution between small cooking groups.\textsuperscript{[96,122,124]} Solutions are often sourced from other injecting users, and are reportedly extracted from a container with the users or dealers syringe, or front/back loaded into the user’s syringe.\textsuperscript{[118,119,122,123,125–128]} Heimer et al.\textsuperscript{[129]} investigated HIV-1 viability and susceptibility to acid exposure during preparation and injection, and found that short exposures significantly reduced the likelihood of recovering viable HIV-1 but did not totally eliminate infectious HIV-1 in contaminated syringes and solutions, even at lowest pH (1.7). They report that methamphetamine when manufactured under very acidic pHs are unlikely to contain viable HIV-1 if stored in contaminated equipment.

Research by Abdala et al.\textsuperscript{[130]} observed how opiate solutions such as ‘Chornaya’ appeared to reduce HIV viability in contaminated syringes, and which underscored the HIV epidemic as centring on injection risk behaviours.

However, the sharing of injecting equipment is reportedly common in home-produced amphetamine type stimulant drugs and characterized by excessive re-dosing and reports of neurological damage.\textsuperscript{[93]} Gawlikowski and Winnik\textsuperscript{[131]} have reported on Guillain-Barré Syndrome, the most common form of polyneuropathy associated with the dependence on the polish opiate (Kompot). Excessive and multiple injecting without a filter (particularly in the case of Krokodil) causes great harm in the form of severe and life-threatening phlebgm, gangrene or internal damage to parenchymatous organs or muscles.\textsuperscript{[91,104,105]} Perhaps most concerning as outlined by Grund et al.\textsuperscript{[91]} is the excessive harms reported by Krokodil users whereby the skin of the user becomes scale-like, discoloured (turning green and black), and ulcerated. Frequent injecting, the inconsistent chemical formulation of Krokodil, and co-existing chemical reactions causes skin and soft tissue infection, thrombophlebitis, necrosis, necrosis of the jaw (‘Phossy Jaw’); damage of thyroid, muscle, and cartilage tissue; inflammation of the liver and kidneys; and deterioration of cognitive functioning, leading to amputation of limbs and ultimately death.\textsuperscript{[14,104,105,132]}

### Conclusion

The review highlights a public health imperative requiring a multidisciplinary approach to quantify the potential impact and required integrated policy responses incorporating international regulation, enforcement, health surveillance, and healthcare delivery. A range of non-medicinal use, diversion, and tampering with prescribed and over-the-counter pharmaceuticals emerges from the literature. Displacement patterns between the non-medical use of pharmaceuticals, commercial, and homemade drugs appear dependent on the availability of opiates, prescribing practices, supervision of substitution drug dosing, availability of cheap ingredients, levels of policing and user awareness of harms.\textsuperscript{[36,105,121]} Responses to the home production of these drug solutions are advised by Grund et al.\textsuperscript{[91]} to focus on their contents, forms (i.e. powder, liquid) generated, production methods, injecting and consumptive routes within their respective micro and macro risk environments relating to paraphernalia and container sharing.\textsuperscript{[134,135]} Use of one- or two-piece syringes for injecting of different substances\textsuperscript{[103]} injecting risks for virus transmission,\textsuperscript{[136–141]} and adverse injecting consequences.\textsuperscript{[93,104,105,107]}

In particular, the proactive monitoring of Internet, commercial, and homemade drug solution markets is advised, along with the sharing of forensic information, and the identification of key emergent adverse health consequences arising from use.\textsuperscript{[13,36]} (Table 1).

Drug monitoring systems, drug workers, and clinicians should be aware of potential presentations for emerging and harmful forms of use and injecting use of homemade drug solutions.\textsuperscript{[104]} Given the adverse health consequences associated with these substances, there is a need for governmental reaction not only by increasing regulation of prescribed and over-the-counter availability of pharmaceutical medications containing the required ingredients but also by providing coordinated service approaches in the form of medical support, counselling, HIV counselling and testing, wound and infection management,
<table>
<thead>
<tr>
<th>Street Name</th>
<th>Drug Type/Chemical</th>
<th>Ingredients</th>
<th>Key Adverse Health and Social Consequences:</th>
<th>Country/City of use</th>
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<tbody>
<tr>
<td><strong>Krokodil</strong></td>
<td>Opiate – Desomorphine</td>
<td>Codeine, gasoline or paint thinner, iodine, red phosphorous, tropicamide</td>
<td>Injecting risks for BBV transmission(^{137-141}) and risks present in the production process, contamination, chemical reaction, sharing of paraphernalia, and group injecting practices.(^{91,96,115})</td>
<td>Russia, Ukraine, Georgia, Kazakhstan, Germany (Bochum, Berlin, Frankfurt), Norway (Tromsø). Also: Anecdotal reports in UK, Czech Republic, France, Belgium</td>
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<td>OTHER COMMON</td>
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<td>Krokodil users presenting in surgeries/emergency rooms with serious and advanced medical complications.(^{91})</td>
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<td>STREET NAMES:</td>
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<td>Undesirable medical and social costs.(^{14})</td>
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<td>Russian Magic, Crocodile, Russian Heroin</td>
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<td><strong>Boltushka</strong></td>
<td>Cathinone</td>
<td>Ephedrine, pseudoephedrine, warm water, household vinegar, and potassium permanganate</td>
<td>Injecting risks for BBV transmission(^{137-141}) and risks present in the production process, contamination, chemical reaction, sharing of paraphernalia, and group injecting practices.(^{91,96,115})</td>
<td>Odessa*</td>
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<td>Baltushka</td>
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<td><strong>Jeff</strong></td>
<td>Methcathinone</td>
<td>Phenylpropanolamine, warm water, household vinegar, and potassium permanganate</td>
<td>Injecting risks for BBV transmission(^{137-141}) and risks present in the production process, contamination, chemical reaction, sharing of paraphernalia, and group injecting practices.(^{91,96,115})</td>
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<td>Jaff, Cat, Mulka, Ephedrone,</td>
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<td><strong>Fentanyl Patches</strong></td>
<td>Opiate</td>
<td>Fentanyl, acetaminophen, caffeine</td>
<td>Fentanyl use is associated with increased odds of overdose.(^{84})</td>
<td>Russia, Belarus</td>
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<td>(new and used).</td>
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<td>Criminality such as: misusers who resort to obtaining used patches from elderly nursing home residents, and searching hospital and nursing home dumpsters for discarded patches.(^{21})</td>
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<td>STREET NAMES:</td>
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<td>China White, White Persian</td>
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<td><strong>Cheomaya</strong></td>
<td>Opiate</td>
<td>Poppy Straw, cigarette ash, sodium bicarbonate</td>
<td>Access to poppy straw is seasonal and when it is scarce, injectors will turn to other opiate-type drugs(^{123})</td>
<td>Russia</td>
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<td>OTHER COMMON</td>
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<tr>
<td>Himiya</td>
<td>Opiate</td>
<td>Poppy straw</td>
<td>Undesirable medical and social costs. Access to poppy straw is seasonal and when it is scarce, injecting</td>
<td>Ukraine</td>
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<td>risks will turn to other opiate-type drugs, including krokodil. Injecting risks for BBV transmission and risks</td>
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<td>present in group injecting practices.</td>
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<td>Braun</td>
<td>Opiate</td>
<td>Mixture of morphine and codeine products e.g.</td>
<td>Undesirable medical and social costs. Injecting risks for BBV transmission and risks present in the</td>
<td>Czech Republic</td>
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<td>hydrocodone</td>
<td>production process, contamination, sharing of paraphernalia, and group injecting practices.</td>
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<td>Kompot</td>
<td>Opiate</td>
<td>Poppy straw, acetic anhydride, acetone</td>
<td>Access to poppy straw is seasonal and when it is scarce, injecting risks will turn to other opiate-type</td>
<td>Poland</td>
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<td>drugs.</td>
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<td>Shirka (Ukraine)</td>
<td>Opiate</td>
<td>Poppy Straw</td>
<td>Access to poppy straw is seasonal and when it is scarce, injecting risks will turn to other opiate-type</td>
<td>Ukraine, Moldova</td>
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<td>drugs. Injecting risks for BBV transmission and risks present in group injecting practices.</td>
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<td>Shirka (Odessa*)</td>
<td>Methamphetamine</td>
<td>Ephedrin, Pseudoephedrine</td>
<td>Binge-using patterns that enhance the probability of unintentional overdoses. Injecting risks for BBV</td>
<td>Odessa*</td>
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<td></td>
<td>transmission and risks present in the production process, contamination, sharing of paraphernalia, and</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>group injecting practices.</td>
<td></td>
</tr>
<tr>
<td>Hemia</td>
<td>Opiate</td>
<td>Poppy straw</td>
<td>Undesirable medical and social costs. Access to poppy straw is seasonal and when it is scarce, injecting</td>
<td>Odessa*</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>risks will turn to other opiate-type drugs, including krokodil and kolyosa. Injecting risks for BBV</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>transmission and risks present in group injecting practices.</td>
<td></td>
</tr>
<tr>
<td>Kolyosa</td>
<td>Opiate</td>
<td>Mixture of codeine containing pills.</td>
<td>Users will turn to this due to poppy straw being unavailable with associated overdose and injecting risks.</td>
<td></td>
</tr>
</tbody>
</table>
Pervitin
Methamphetamine
Ephedrine, pseudoephedrine, industrial chemicals such as gasoline, Toluene and Tetrachlorethylene

Pervitin
Injecting risks for BBV transmission
in the production process, contamination, sharing of paraphernalia, and group injecting practices.

Street Name Drug Type/Chemical Ingredients

Table 1.

(Continued)

Binge-using patterns that enhance the probability of unintentional overdoses.

Undesirable medical and social costs.

* Ukraine - refers to all cities in Ukraine, except Odessa, which has a range of different terms/names for their homemade drugs.

Injecting risks for BBV transmission
in the production process, contamination, sharing of paraphernalia, and group injecting practices.

Undesirable medical and social costs.

outreach support, and rehabilitation for users. [104,105,107,115,142–146]

Research in certain countries experiencing diffusion of homemade drug use and injecting, have reported on the negative impact of policing on effective drug treatment [14,91,147] and evidence for unequal treatment of injecting drug users by health professionals, resulting in subsequent reluctance of users to access treatment. [112,148–152] Equally, a proactive approach to developing appropriate harm-reduction tactics (needle exchange, bleach distribution, hygiene, provision of filters, foil packs to encourage route reversals, and safer injection facilities), safer home-produced opioid injectable recipes, screening, treatment (opiate substitution therapy, antiretroviral therapy), therapy, and prevention programmes is vital. [93,143–146] The introduction of field testing of samples and a greater observational and operational understanding of the cooking process and the chemical composition of substances is warranted. [20,79,91,93,121] Continued efforts to engage with users and conduct qualitative and ethnographic research to explore user perceptions of harm, user practices, trajectories of use, and experiences of services are vital to inform targeted harm reduction tactics in each country. [91]

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